

ORIGINAL

Decision No. 42601

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Investigation upon the Commission's own motion into the reasonableness and propriety of rates, rules, regulations, contracts and practices of electrical corporations in connection with electric service furnished for use in and operation of electric welding machines and equipment.

Case No. 4963

Bruce Renwick and Rollin E. Woodbury for Southern California Edison Company; R. W. DuVal and Rudolph Jenny for Pacific Gas and Electric Company; George Kinsman for California Manufacturers Association; G. C. Delvaille for California Electric Power Company; J. J. Deuel for California Farm Bureau Federation; H. G. Billin and S. R. Duhring for San Diego Gas and Electric Company; J. K. Horton, G. E. Bishop, and Charles Grunsky for Coast Counties Gas and Electric Company; Oliver O. Rands for the Commandant of the Twelfth Naval District; Albert Hamilton for Sacramento Municipal Utility District.

O P I N I O N

In this proceeding, instituted by the Commission on its own motion, an investigation has been conducted into the rates, rules and practices pertaining to the supply of electric service to electric welding equipment by electrical corporations under this Commission's jurisdiction. Testimony and documentary evidence were presented at public hearings in Los Angeles and San Francisco by witnesses for several of the operating companies and by members of the Commission's staff. Appearances were entered, and statements presented, by other interested parties.

It is clearly evident that existing rules and regulations applicable to electric service for welding machines should be revised. The rules of several companies now contain requirements that electric welders must be corrected to at least 90% power factor, and some require that welders of more than 2 kw shall be served separately.

The largest company is presently operating under an interim modification of the power factor requirement, although the evidence shows that the correction of power factor has little effect toward mitigation of the difficulties of electric supply to such equipment.

In the consideration of existing rates and rules and of such revisions thereof as may be justified and reasonable, it is necessary to recognize the unusual nature of the electric service required by welding equipment. It should be noted that the discussions in this matter are confined to alternating current service. The distribution by the operating utilities of direct current for general service is very limited. Of principal concern is alternating-current service to transformer-type arc welders and resistance welder machines. The evidence shows that motor-generator sets which are driven by alternating current, usually 3-phase, and which supply direct current for the welding process, have characteristics quite different from the transformer type of welder. Furthermore, the tariffs of many of the companies now contain provisions for adequate treatment of motor-generator sets. The revision of rules and tariffs herein ordered and authorized will provide for tariffs and the conditions of alternating-current service to electric welding machines of the transformer or resistance-box type, including those which may contain rectifiers, but excluding motor-generator sets. The transformer-type electric welders impose upon the supplying system high peak demands, sometimes of extremely short duration but rapidly repeated, wide variations in power factor, while often consuming relatively small amounts of energy with resulting low ratios of the kilowatt hour use to the demand imposed.

In view of the unusual requirements of such welding equipment, changes in rules necessarily may require adjustments in rates in order that the added burdens experienced by the companies in the supply of

service to welders shall not be imposed upon other services. Some parties to this proceeding apparently hold the position that service to electric welding equipment should be considered on an incremental basis and charged only to the extent that it may require facilities over and above those required for the services and reserves previously provided. Service to welding machines should participate, in general, in providing for its appropriate share of the burdens of supplying and distributing electricity. However, as a practical matter it is necessary that service to small welder units be provided under existing tariffs without adjustment thereof in order that the costs of control may not be excessive.

In providing for revision of tariffs it is desirable that those factors which enter directly into billing calculations and the limits of applicability of individual rates be stated in the rate schedules. Definitions, technical details of ratings, and limitations of service appropriately may be placed in the rules and regulations. The rate schedules may be expected to vary as between different companies, certainly as to level if not as to form. On the other hand, it is desirable that the rules and regulations be as uniform as possible throughout an area in which the utility operations are so interlaced as they are in California.

In view of these conditions, the order herein will provide for the removal from the rules and regulations of power factor requirements as presently applied to electric welders, and provide a uniform basis for the rating of transformer-type and resistance-box welders and will authorize certain of the utilities to file revisions of their tariffs so as to provide appropriate charges for electric service to welders. The operations of three electrical corporations, Walton N. Moore Corporation, Bessie L. Norby, and Pacific Electric Railway Corporation, are of limited scope and no revisions of their tariffs will be necessary.

The present rules and regulations of most of the companies contain provisions reserving to the company the right to refuse to supply, or to discontinue service to, loads of a character that may seriously impair service to any other customers. Furthermore, the rules provide in most cases that the company may require the customer, at his own expense, to provide suitable equipment to limit fluctuations in the case of hoist or elevator motors, welders, furnaces, compressors and other installations of like character, where the use of electricity is intermittent or subject to violent fluctuations. It appears that such provisions, in so far as they pertain to electric welders, should be retained. However, the evidence shows that interpretation of those provisions and some indication of the extent to which they may be applied is necessary. In the case of electric welders the customer should be required to provide such auxiliary equipment or arrangements only in those cases in which the welding equipment is of unusual and inadequate design or the welding process is so abnormal as to create fluctuations beyond those which might reasonably be expected from welding machines with normal characteristics operating in the customary manner. This imposes upon the supplying company the burden of preventing any serious impairment to service of other customers which might be occasioned by reasonable operation of normal welding equipment. It should not be inferred, however, that the supplying company is required to prevent disturbance to other service for the same customer delivered in combination with service to the electric welding equipment.

Customers should be able to receive service for electric welders, to as great an extent as reasonably can be provided, as a part of their general service for ordinary purposes. Certainly, such combination of service requirements is possible for welding machines smaller than some minimum limit and of proper design. The evidence indicates that transformer or resistance-box arc welders, which require a maximum input not greater than 12 amperes at 115 volts, can be so

treated. On the systems of most companies, arc welders which conform to the present National Electrical Manufacturers Association's standards for "limited input" welders, and have maximum input currents of about 37 amperes at 230 volts, can also be accommodated as a part of ordinary service. Certain companies, however, have established limitations on service supplied under domestic and commercial lighting schedules which make it desirable at this time to retain conforming limits on the size of welders which may be supplied on those schedules by those companies.

In approaching the problem of providing a basis for the rating of welders for the purposes of tariff schedules, it is noted that the characteristics of resistance-type and transformer-type welders, although to some extent comparable to motor characteristics, are not entirely parallel thereto. Welder installations for industrial purposes are generally considered as power load, but the welders themselves do not produce mechanical power, and welder ratings can not be established by the criteria used in the rating of motors. Tariff provisions which refer to motors are not to be construed as applying to transformer-type and resistance-box welders.

The Commission's staff, in its presentation, proposed the rating of resistance welders upon the basis of maximum input and the rating of arc welders at the input kva under rated output current and voltage, or at $2/3$ of the steady-state short-circuit output current when set for maximum open-circuit output voltage, whichever is the greater. In adjusting tariffs, however, the staff's engineer applied, to the rating, factors ranging from 0 to 70%. Certain of the existing tariffs provide for the rating of welders at 50% or 40% of the maximum input depending upon the type of welder. Either method may be appropriate if the factors introduced in the tariffs are adjusted to correspond.

It has been urged that the classification of service to welders should be determined. The larger welders and welder installations are most often a part of industrial operations and are considered to be encompassed within the meaning of power service. Nevertheless, any single welder is just another appliance and the smaller ones may be used for general domestic or household purposes.

The record contains considerable discussion of proposed provisions for the treatment of cases where the application of the suggested tariff provisions might be inequitable. The statutes and this Commission's procedural rules and regulations provide appropriate procedures for those occasional cases where extraordinary circumstances, which are not provided for in tariffs designed for general application, exist with respect to electric service for a customer. There appears no necessity for specific mention of those procedures in the rules and tariff provisions applicable to electric welders.

O R D E R

An investigation having been conducted on the Commission's own motion, hearings having been held, the matter having been submitted, and the Commission being advised in the premises,

IT IS HEREBY FOUND AS A FACT that the existing rules and regulations of electrical corporations under the jurisdiction of this Commission are unjust and unreasonable to the extent that they require the correction of power factor of electric welders, or provide for the rating of electric welders on a basis which differs from that ordered herein, or require that welders of more than 2 kw shall be served through separate services; and

IT IS HEREBY FOUND AS A FACT that such increases in rates or charges as may result from the making effective of the revisions of tariff schedules ordered or authorized herein are justified, therefore,

IT IS HEREBY ORDERED that within sixty (60) days from and after the effective date of this order, each of those electrical corporations within the jurisdiction of this Commission, except Walton N. Moore Corporation, Bessie L. Norby, and Pacific Electric Railway Corporation,

1. Shall file, to become effective thirty (30) days from the date of filing, such revisions of its tariff schedules as may be necessary to remove therefrom all requirements for the correction of power factor of electric welders, provisions for the rating of electric welders on a basis which differs from that ordered herein, and all existing requirements that welders of more than 2 kw shall be served through separate services.
2. Shall file, to become effective thirty (30) days from the date of filing, as a part of its Rule and Regulation No. 2, provisions substantially in accordance with those shown in Appendix A attached hereto and made a part hereof.
3. May file, concurrently with the filing required by Sections 1 and 2 above and to become effective upon the same date as said filing, such revisions of its tariff schedules as will provide for:
 - (a) The application of its general power tariffs to welders which are metered separately from other load;
 - (b) The confinement of the combination of other service with service to welder installations which exceed 2.9 kva at 230 volts or 0.5 kva at 115 volts to those services which are rendered on general power tariffs, agricultural power tariffs, combined light and power tariffs, and tariffs which are applicable to general service*;

(*For the purposes herein, the phrase "tariffs applicable to general service" is not intended to include domestic tariffs, lighting tariffs on which only small amounts of power load may be combined with lighting, or tariffs applicable to special services.)
 - (c) The adjustment of connected load for service to transformer-type electric welders, whenever connected load is used under the above cases (a) or (b) except in resale tariffs, so as to add to the connected load other than the welder load, (1) if the rated welder load is greater than 5% but not greater than 70% of the other connected load, an amount equal to the rated welder load multiplied by two times the ratio of the welder load to the sum of the rated welder load and 70% of the other load; or (2) if the rated welder load is greater than 70% of the other connected load, an amount equal to the rated welder load; and

- (d) The adjustment of metered demand for service to transformer-type electric welders, whenever metered demand is used under the above cases (a) or (b) except in resale tariffs, so as to add to the metered demand, (1) if the rated welder load is greater than 5% but not greater than 100% of the metered demand, an amount equal to the rated welder load multiplied by two times the ratio of the welder load to the sum of the metered demand and the welder load, or (2) if the rated welder load exceeds the metered demand an amount equal to the rated welder load.

The effective date of this order shall be twenty (20) days after the date hereof.

Dated at San Francisco, California, this 15th day of March, 1949.

R. E. Anderson
Justus F. Adams
Joseph F. Lowell
Harold P. Hull

Commissioners

APPENDIX A

DETERMINATION OF WELDER KVA RATINGS FOR TARIFF PURPOSES

1. Electric Welders:

- (a) The rating of resistance-box and transformer-type welders and installations of such welding equipment shall be determined for the purposes of these tariff schedules as follows:
- (b) Each individual arc welder will be rated in kva at $1/3$ of the input kva at rated input voltage and steady-state short-circuit output current when set for maximum open-circuit output voltage, or at $1/2$ of the input kva at rated input voltage and rated output current when set for maximum open-circuit output voltage, whichever is the greater kva.
- (c) Each individual resistance welder will be rated in kva at $1/2$ of the input kva at rated input voltage and steady-state short-circuit output current when set for maximum open-circuit output voltage.
- (d) The ratings prescribed by (b) and (c), above, normally will be determined from manufacturer's information on the type and model of welder but may be determined by test at the option and expense of the Company.
- (e) For welder installations of more than one welder supplied through one meter, the welder kva for the application of tariffs to deliveries through that meter shall be the sum of the individual welder kva ratings multiplied by the following factors:
 - 1.0 times the highest individual welder kva rating;
 - 0.8 times the rating of the second welder of equal or the next highest rating,
 - 0.6 times the ratings of all additional welders.
- (f) If established by seals approved by the Company, the welder kva may be limited by the sealing of taps which provide capacity greater than the selected tap and/or by the interlocking lockout of one or more welders with other welders.
- (g) Computations of individual ratings and of aggregate welder kva will be adjusted to the nearest 0.1 kva. When conversion of units is required for tariff application, 1 welder kva will be taken as 1 kw or 1.34 hp.